

CLAIMS

1. A recombinant lactic acid bacterium which has been genetically modified so as to provide it with a
5 respiratory metabolism, or to activate said metabolism.
2. The lactic acid bacterium as claimed in claim 1, characterized in that it has undergone at least one genetic modification consisting in the addition of at
10 least one gene encoding a protein involved in respiratory metabolism or promoting said metabolism.
3. The lactic acid bacterium as claimed in either of claims 1 and 2, characterized in that it has undergone
15 at least one modification resulting in the overexpression of at least one gene encoding a protein involved in respiratory metabolism and/or a modification resulting in the activation of at least one protein involved in respiratory metabolism or
20 promoting said metabolism.
4. The lactic acid bacterium as claimed in any one of claims 1 to 3, characterized in that it has undergone at least one modification resulting in the complete or
25 partial inactivation of at least one gene encoding a protein involved in fermentative metabolism or promoting said metabolism, and/or at least one modification resulting in the underexpression of at least one gene encoding a protein involved in
30 fermentative metabolism or promoting said metabolism.
5. The lactic acid bacterium as claimed in claim 2, characterized in that said gene is chosen from:
 - the genes encoding proteins of the heme
35 biosynthesis pathway;
 - the genes encoding proteins of the cytochrome biosynthesis pathway;
 - the genes encoding proteins of the Krebs cycle.

6. The lactic acid bacterium as claimed in claim 3, characterized in that said gene is chosen from:

- 5 - genes regulating metabolic pathways promoting the respiratory pathway;
- enzymes of the cytochrome biosynthesis pathway;
- genes encoding hemin proteins.

7. The lactic acid bacterium as claimed in claim 4, characterized in that said gene is chosen from the *ccpA* gene and the *gls24* gene.

8. The lactic acid bacterium as claimed in any one of claims 1 to 7, characterized in that it is chosen from bacteria of the genera *Lactococcus*, *Lactobacillus*, *Leuconostoc*, *Streptococcus*, *Propionibacterium*, *Bifidobacterium*, or *Enterococcus*.

9. The lactic acid bacterium as claimed in any one of claims 1 to 3, characterized in that it is a strain of the species *Lactococcus* or *Streptococcus* transformed with at least one gene encoding a protein of the heme biosynthesis pathway.

10. A method of bacteria culture, characterized in that it comprises the culture of at least one strain of lactic acid bacterium as claimed in any one of claims 1 to 9, under conditions allowing the induction of a respiratory metabolism in said strain.

11. The method of culture as claimed in claim 10, characterized in that it is carried out for the production of a lactic starter culture, and in that it comprises harvesting the bacteria at the end of said culture.

12. A lactic starter culture comprising at least one strain of lactic acid bacterium transformed as claimed in any one of claims 1 to 9.

13. The method for preparing a fermented product, characterized in that it comprises inoculating a medium to be fermented using a lactic starter culture as
5 claimed in claim 12.

14. The use of a lactic starter culture as claimed in claim 12 for the preparation of a fermented product.

10 15. From a recombinant lactic starter culture, having the respiratory properties as claimed in claims 1 to 9, the introduction of a gene encoding any protein of interest.

15 16. The use of the strain described in claim 15 under respiratory conditions for the production of said heterologous protein.